

REMARKS

1. Restriction

Restriction has been required to one of three identified groups of claims.

- I. Claims 1–22
- II. Claims 23–30
- III. Claims 31–33

Applicants affirm the election to prosecute the claims of Group I without traverse. Claims 23–33 have, accordingly, been canceled.

2. Examination

Claims 1–22 have been examined. Claims 1–7 and 13–20 stand rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 6,706,037 (“Zvuloni”); Claims 8–10 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Zvuloni in view of U.S. Patent No. 6,039,730 (“Rabin”); Claims 11 and 12 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Zvuloni in view of U.S. Patent No. 5,417,072 (“Silver”) and further in view of U.S. Patent No. 5,924,975 (“Goldowsky”); Claim 21 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Zvuloni in view of U.S. Patent No. 4,519,389 (“Gudkin”); and Claim 22 stands rejected under 35 U.S.C. § 103(a) as unpatentable over Zvuloni in view of U.S. Patent No. 5,741,248 (“Stern”).

Independent Claim 1 has been amended to recite aspects of the invention more particularly. These amendments include some of the limitations of Claim 6, which has, accordingly, been canceled. In addition, language has been added to Claim 1 to clarify the nature of the “critical point.” As used throughout the application, in both the specification and claims, references to a “critical point” are intended to refer to a specific physical property of substances. This property may be understood with reference to Fig. 1 of the Application, which shows a phase diagram — the numerical values of the pressure and temperature axes are suitable

for nitrogen, but the general shape of the diagram is typical of many substances. The phase diagram shows that under different pressure and temperature states, the substance may be in different physical phases, with the diagram identifying regions where it is in a “gas” phase, a “liquid” phase, or a “solid” phase. A common characteristic of substances is that the line in this pressure-temperature space that separates the liquid and gas states terminates in a point (shown in Fig. 1 but not identified with a reference number). This point is commonly referred to in the art as the “critical point” and has a temperature and pressure characteristic of the substance. *See also* Application, p. 9, ll. 4–9.

There are a number of different ways in which the critical point may be characterized physically. Independent Claim 1 has been amended to include language defining the critical point as where molar volumes are substantially equivalent for liquid and gas phases (*see* Application, p. 8, l. 31 – p. 9, l. 1). Amendments have also been made to the claims for consistency with the amendments to Claim 1, including consistent reference to the cryogen as being a “fluid.”

It is respectfully noted with these clarifications that the cited art does not teach or suggest circulation of a cryogenic fluid under physical conditions near the critical point. The application explains at length how such circulation results in the avoidance of vapor lock, a phenomenon that is an undesirable consequence of prior art approaches. Such prior art approaches use *evaporative cooling* techniques, which characteristically operate well away from the critical point. This is particularly evident in Joule-Thomson approaches where rapid expansion and decompression of high-pressure *gases* produce cooling from the Joule-Thomson effect at a probe tip. Other prior art techniques use flows of *liquid* cryogens that create cooling during evaporation at, or near, a probe tip. The fact that these prior art approaches use substances having a well-defined phase of “liquid” or “gas” clearly distinguishes them from the claimed structures since such distinctions do not exist near the critical point.

It is noted that in several instances the Office Action suggests that certain limitations recited in various of the claims may not be entitled to patentable weight. Applicants

understand this position to arise because of use of language that the computer processor is “adapted to” perform certain functions. To clarify that the language is intended to be limiting, the claims have been amended to recite instead that the computer processor “comprises instructions” to perform the recited functions (*see, e.g.*, Application, p. 34, ll. 27–31). Such language comports fully with the Office’s extensive guidelines related to computer-related inventions discussed at MPEP 2106 to act as limitations to be afforded patentable weight.

Examination of the claims as amended is, accordingly, requested.

3. Conclusion

In view of the foregoing, Applicants believe all claims now pending in this application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 303-571-4000.

Respectfully submitted,



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